



Laboratory Validation of AT585 Organic Amines Sampler

Prepared by: C.R. Manning, PhD, CIH

Revised: 10 May 2017

These tests for the evaluation of diffusive air samplers were conducted within the guidelines described in ANSI 104-1998.

Organic Amines Sampler

Assay Technology's 585 Organic Amines Sampler consists of a fiberglass wafer coated with 1-naphthyl isothiocyanate (NIT) encased within a 76-port polypropylene sampling grid contained within a polypropylene sampler body.

Naphthylisothiocyanate coated on a porous fiberglass disc, which has previously been used in active and diffusive sampling for amines, reacts directly with most aliphatic primary and secondary aliphatic amines to form stable thiourea derivatives. NIT derivatives are readily separated by High Performance Liquid Chromatography (HPLC) and may be detected by ultraviolet absorbance in the vicinity of 280 nm.

1. Test Apparatus & Method

Exposures of organic amine vapors were generated by the amine exposure challenge lab method. The amines tested were:

- n-butylamine
- cyclohexylamine
- ethanolamine
- ethylenediamine
- morpholine

In this method, amine levels were continuously generated in an inert chamber in which the environment was continuously circulated through a sampling chamber containing monitors to be tested. Active air sampling tubes bracketing the monitors in the chamber were also sampled during as a reference for determining actual chamber concentrations.

2. Desorption Efficiency (DE)

Analyte recovery and desorption efficiency were determined by analysis of diffusive samplers spiked from standard analyte solutions. Desorption efficiencies were in the range of 80 – 94% for ten amines (Table 1).

3. Determination of the Effect of Concentration Sampling Rate (verification of diffusive sampling rate)

Samplers were exposed to concentrations in chambers as described in Section 1, and were then analyzed by AT585 Method (modified OSHA 60). Exposures were applied to samplers in the range of 0.2-2 times the PEL for the five organic amines listed in Section 1.

Laboratory Validation of AT585 Organic Amines Sampler

Prepared by: C.R. Manning, PhD, CIH

Revised: 10 May 2017

Table 1. % Recovery (DE) of amines from NIT-treated media.

Organic Amine Collected on Monitor	Level of Amine Collected (μg)	% RECOVERY (HPLC of NIT Derivative)
Methylamine	3-35	80 %
Ethylamine	4-40	80 %
Dimethylamine	4-40	91 %
Diethylamine	2-23	91 %
Ethanolamine	1-14	94 %
Ethylenediamine	5-46	90 %
Butylamine	2-23	91 %
Diethylenetriamine	0.6-6	94 %

4. Background (Blank) Determination

Unexposed samplers were analyzed to determine background analyte levels (if any) on the sampler prior to sampling. The reagent-treated wafer on which amine is collected has been prepared from an inert fiberglass shown to be superior to paper with respect to both its inertness and its lower background levels. No background response was detectable (< reporting limit (RL) for ten organic amines).

5. Atmospheric Effects

Air Velocity & Orientation – Previous studies demonstrated that there is no significant effect of air velocity and orientation on sampling rate.

Temperature and Humidity – Diffusion rates and sampling rates of vapors in air have been shown in previous studies to be unaffected by humidity variations provided that moisture levels encountered do not create aerosols or react chemically with the analyte. Potential humidity effects were evaluated by determining if high humidity exposures led to loss of previously collected amine. Humidity-exposed samples showed negligible loss of amine after three days.

6. Stability (storage post-sampling)

Amine samples collected on NIT media and exposed to the equivalent of sampling five liters of humid air showed negligible loss of amine for seven primary and secondary amines.

Amine samples collected on NIT media, then packaged and stored, showed negligible loss of amine in one week for seven primary and secondary amines.

7. Sampling Rate Verification Studies

According to internal specifications, periodic testing on the 585 samplers is performed to verify product performance and published sampling rate.



Laboratory Validation of AT585 Organic Amines Sampler

Prepared by: C.R. Manning, PhD, CIH

Revised: 10 May 2017

8. Summary Comments

Sampler AT585 has been evaluated, and is recommended for sampling organic amine vapor under the following conditions.

Sampling Time	15 minutes – 8 hours
Air Velocity	15-150 cm/sec
Temperature	0 – 50 °C
Humidity	10-80% RH

It is recommended that the AT585 Sampler be used within the envelope of conditions specified above.

The recommended maximum holding time after sampling is 28 days at room temperature.